

REMARKS

The Examiner rejects Claims 1 and 5 under 35 U.S.C. §112, second paragraph, as being indefinite in using the phrase “intolerable echo energy”. The claims have been amended to overcome this rejection.

The Examiner rejects Claims 1-4, 7, 11-13, and 16 under 35 U.S.C. §102 as being anticipated by either Litzenberger et al. or Hamilton et al.; Claims 1-4, 7, 9-13 and 16 under Section 102 as being anticipated by Dreyfert et al.; Claims 5 and 18 under 35 U.S.C. §103(a) as being unpatentable over Litzenberger et al. as applied to Claims 1 and 16 above and further in view of JP-05268121; Claims 6, 15, and 17 under Section 103(a) as being unpatentable over Litzenberger et al. as applied to Goeddel et al.; and Claims 8, 14, 19, and 20 under Section 103(a) as being unpatentable over Litzenberger et al. and further in view of Davis et al.

Applicant respectfully traverses the Examiner’s rejections because the references fail to teach or suggest at least the italicized features in independent Claims 1 and 11:

1. A method for performing echo cancellation within a switching center of a communication network, said switching center being coupled to a plurality of local user devices and a plurality of external transmission media, said method comprising the steps of:
  - providing a pool of echo cancellation units within said switching center;
  - coupling a first local user device to a first external transmission medium as part of a communication connection between the first local user device and a remote user device;
  - monitoring the first external transmission medium for at least one of echo cancellation activity and echo energy during the communication connection between the first local user device and the remote user device;*
  - when the detected at least one of echo cancellation activity and echo energy is above a determined threshold, allocating a first echo cancellation unit from the pool of echo cancellation units to the communication connection; and*
  - when the detected at least one of echo cancellation activity and echo energy thereafter falls below the determined threshold, discontinuing the allocation of the first echo cancellation unit to the communication connection.*

11. A switching center for use within a communication network, comprising:
  - a plurality of first ports for use in coupling the switching center to a plurality of local user devices;
  - a plurality of second ports for use in coupling the switching center to a plurality of external transmission media, each of said plurality of external transmission media being coupled at an opposite end to another switching center within the communication network;
  - a switch for selectively coupling individual first ports to individual second ports within the switching center for use in establishing communication connections between local user devices and remote user devices in the communication network;
  - a pool of echo cancellation units that are each capable of reducing echoes received by said switching center from an external transmission medium; and
  - an allocation unit for allocating an echo cancellation unit from said pool of echo cancellation units to a communication connection being supported by the switching center *in response to detection of echo energy above a threshold level from an external transmission medium associated with said communication connection and terminating allocation of the echo cancellation unit to the communication connection in response to detection of echo energy below the threshold level.*

Litzenberger et al.

Litzenberger et al. is directed to a pool of echo cancellers 126 providing echo cancellation on PCM digital transmissions on an as needed basis. A dynamic port device 110 operating under the direction of call processing 134 identifies the transmissions requiring echo cancellation and routes the identified transmissions through echo cancellers. The echo cancellation can be performed on an as needed basis without having to dedicate an echo canceller to each DSO channel. The dynamic port device 110 can provide multiplexing up to SONET 114 carrier levels immediately following selective echo cancellation.

Although somewhat vague on when echo cancellation is triggered, Litzenberger et al. appears to teach that echo cancellation is deemed not to be needed when digital data is detected (page 4, lines 20-23, and page 10, lines 17-21), when the transmission delay is sufficiently short (page 6, lines 18-22), or when echo cancellation has been applied at a different point in the transmission (page 6, lines

22-24). Litzenberger et al. fails to teach or suggest (and actually teaches away from) the use of either echo cancellation activity or echo energy measurement in determining whether echo cancellation is required. Litzenberger et al. says nothing about terminating echo cancellation before call termination after an initial determination is needed that echo cancellation is needed. After the initial determination is made to perform echo cancellation, it appears that echo cancellation is performed, whether needed or not, until the call is terminated.

Hamilton et al.

Hamilton et al. is directed to a technique for using call processing resources in a call processing system in which echo characteristics of a telephone line ascertained and used by an echo canceller are stored for later use by a different echo canceller which processes a call on the same telephone line. Hamilton et al. teaches that a pool of undedicated echo cancellers is used on an as needed basis. Although Hamilton et al. teaches that “[t]he echo canceller may be requested immediately after the call begins or may be requested and allocated to that call upon particular conditions requiring the echo canceller (e.g., playback),” Hamilton et al. does not specifically teach determining whether or not to perform echo cancellation based on the amount of echo cancellation activity and echo energy and says nothing about terminating echo cancellation before the call is terminated let alone terminating echo cancellation in response to a determination that echo cancellation is no longer needed.

Dreyfert et al.

Dreyfert et al. is directed to an echo canceller pool configuration that allows a user to predetermine and individualize the echo cancellation parameter settings for any echo canceller in the

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pool, based on prior knowledge of the echo path characteristics of the specific transmission route to be used for an ensuing call. The echo canceller with the individualized parameter settings is then switched into that route for the duration of the call. For example, at call setup, once a trunk route has been identified that will be used to complete the call, a flag is retrieved that is associated with that specific route. That flag identifies specific echo canceller parameter settings to be used for that route. Those parameter settings are downloaded to the echo canceller device selected from the pool, and that device is then switched into the specific trunk involved. An operator can thereby optimize echo cancellation in the system and significantly improve speech quality overall.

Dreyfert et al. teaches that the decision whether or not to use echo cancellation is based on the historical echo path delay characteristics of the trunk route involved. (Col. 5, lines 4-18.) Dreyfert et al. therefore teaches away from basing the use of echo cancellation on the actual echo energy experienced during the call. Moreover, Dreyfert et al. specifically teaches away from terminating echo cancellation before call termination by teaching that echo cancellation is performed for the entire duration of the call. (Col. 2, lines 44-52.)

JP 04062973

JP 04062973 teaches that the initial decision on whether or not call cancellation is needed is based on the called subscriber telephone number; that is, it is based on whether or not the call is long distance. When talking commences, the exchange 21 starts an adaptive operation of the echo canceller 22 and, when a prescribed time elapses, the adaptive operation (or echo cancellation) is stopped. When the voice quality deteriorates, the subscriber A operates a pushbutton of a telephone set to enter a specific number and the exchange 21 is commanded to implement the adaptive

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operation of the echo canceller 22 again. The exchange 21 starts the adaptive operation of the echo canceller 22 according to a command from the subscriber A.

According to JP 04062973, the initial decision on whether or not echo cancellation is used is based not on echo cancellation activity or echo energy but on whether or not the call is long distance. If the call is a local call, it does not appear that echo cancellation is performed. Although JP 04062973 teaches that echo cancellation is stopped before the call terminates, it is not stopped based on echo cancellation activity or echo energy but on the expiration of a selected time period. To reinitiate echo cancellation, the subscriber must press a button. This approach is highly undesirable, as the subscriber will experience rapid drops in voice quality and must manually press a button to restart echo cancellation. In a long call, the subscriber may have this cycle repeated numerous times. The approach of the present invention, namely basing echo cancellation need directly or indirectly on the actual echo energy levels encountered, is superior to the manual approach of JP 04062973.

Neither Goeddel et al. nor Davis et al. overcome the deficiencies of the above references.

Accordingly, the claims are allowable over the cited prior art.

The dependent claims provide further bases for allowance.

By way of example, Claim 6 requires the at least one of echo cancellation activity and echo energy is echo energy and said step of monitoring includes allocating a call classifier to said communication connection and receiving an indication from said call classifier that echoes above a predetermined power level are being received from said first external transmission medium.

Claim 7 requires the at least one of echo cancellation activity and echo energy is echo cancellation activity and said step of monitoring includes assigning an echo cancellation unit to said communication connection and receiving an indication from said echo cancellation unit that echoes above a predetermined power level are being received from said first external transmission medium; and said step of allocating includes allowing said echo cancellation unit to continue performing echo cancellation for said communication connection for the duration thereof.

Claim 10, which depends from Claim 6, requires that, when the detected at least one of echo cancellation activity and echo energy fails to exceed the determined threshold within a predetermined time interval after allocating the call classifier, the call classifier terminates the monitoring step.

Applicants have added new Claims 21-31, which are allowable for reasons stated herein. For example, the prior art fails to teach or suggest at least the following italicized features of Claim 21:

A method for performing echo cancellation within a switching center of a communication network, said switching center being coupled to a plurality of local user devices and a plurality of external transmission media, said method comprising the steps of:

providing at least one echo cancellation unit within said switching center;

coupling a first local user device to a first external transmission medium as part of a communication connection between the first local user device and a remote user device;

performing echo cancellation with the at least one echo cancellation unit on the communication connection;

*thereafter monitoring the first external transmission medium for at least one of echo cancellation activity and echo energy; and*

*when the detected at least one of echo cancellation activity and echo energy thereafter falls below the determined threshold, discontinuing echo cancellation of signals on the first external transmission medium.*

Based upon the foregoing, Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation

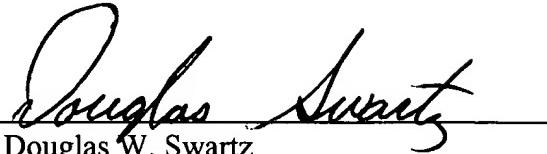
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would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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